DOCUMENT RESUME

ED 388 797 CE 070 181

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TITLE Report Writing for Technical Staff. P.R.I.D.E. People Retraining for Industry Excellence.
INSTITUTION Mercer County Community Coll., Trenton, N.J.
SPONS AGENCY Office of Vocational and Adult Education (ED), Washington, DC. National Workplace Literacy Program.
PUB DATE 95
CONTRACT VA198A30142-93
NOTE 35p.; For related documents, see ED 351 578-599, ED 368 968-988, and CE 070 164-183.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Adult Basic Education; Adult Literacy; Behavioral Objectives; Competency Based Education; Curriculum Guides; Engineering; Instructional Materials; Labor Force Development; Learning Activities; *Literacy Education; *Technical Writing; *Writing Instruction; Writing Processes
IDENTIFIERS Workplace Literacy

ABSTRACT

This guide, part of a series of workplace-developed materials for retraining factory workers, provides teaching materials for a workplace course in report writing skills for technical staff. The course has been designed to help new engineers with all aspects of report writing. It covers the outline and structure of reports, brainstorming, organization, and the most effective ways to present information. It includes applications of the principles of good writing, including grammar, punctuation, and mechanics. The introductory materials include a course outline, course objectives, and a topical outline. Lesson plans for six sessions are provided. The session materials include teaching notes, information sheets, exercises, and worksheets. (KC)

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ED 388 797

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Report Writing for Technical Staff

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P.R.I.D.E.

PEOPLE RETRAINING for INDUSTRY EXCELLENCE

CE 070 181

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Report Writing for Technical Staff

Mercer County Community College
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1995

ACKNOWLEDGMENT

Mercer County Community College thanks Lorna Burt, Senior Education Specialist/Curriculum Developer for creating this manual. Through her valuable contributions employees in manufacturing and service industries learned concepts relevant to their existing jobs and strategies for learning other tasks if that opportunity should arise.

WORKPLACE SKILLS TRAINING PHILOSOPHY

A factory or service center creates a classroom that is very different from the one we are used to seeing in colleges and adult schools, so it only follows that our approach to teaching in the factory should also differ.

Our goal is to teach employees skills that they need in order to be functional and successful in their work environment, and encourage them to apply those skills on the job and at home. For example, we motivate students to do the following:

- work more efficiently and more safely
- make fewer mistakes
- solve problems working interactively
- take greater responsibility for their jobs
- recognize the interconnectedness of the various jobs in their workplace
- be better communicators in the workplace

Company needs are revealed through a needs assessment. At that time, we also determine the basic skills needs of the employees. We are learner centered, as the individual employee's needs are considered alongside those of the company.

Once we have determined those needs, we develop curricula that incorporate basic skills, using the workplace literature (e.g. forms, applications, codes, abbreviations, charts and tables, handbooks, regulations, procedures, policies, memos, letters) of the company. Because each company is different, the needs and literature are also different; hence, we develop new materials for every company in which we teach. By utilizing these workplace items, we help students transfer and apply their skills directly to their jobs.

We rely on the classroom techniques of problem solving, cooperative learning, and group discussion. Our overall approach is concept based, with the emphasis on application, such as in role plays, dialogues, and group work. Despite the specific course titles, we incorporate the elements of math, English, and communication skills into all of our sessions.

In terms of students evaluation, after initial testing we give a pre-test and post-test in order to determine comprehension. Students receive feedback throughout the course from the instructor, as well as from fellow students as we sincerely believe in the powerful positive reinforcement of peer critiques and cooperative exchanges.

In essence, we believe that although we make the materials for the students with which to work, it is the students who truly make the class.

REPORT WRITING FOR TECHNICAL STAFF

COURSE OUTLINE:

This course has been designed to help new American engineers with all aspects of report writing. We will focus on the outline and structure of reports, brainstorming, organization and the most effective ways to present information. We also apply the principles of good writing, including grammar, punctuation and mechanics, already covered in the Business Writing class.

OBJECTIVES:

Upon completion of this course, students will be able to do the following:

- clearly identify the scope and purpose of the report
- analyze who will be reading the report
- brainstorm effectively
- write a clear preliminary purpose statement
- manage the time spent on writing more efficiently
- write a progress report
- present information effectively
- apply the principles of good business writing
- construct clear reports using the suggested outline

TOPICAL OUTLINE:

- analyzing scope and purpose, the reader(s), the style
- prewriting – brainstorming and organizing ideas
- managing time spent on writing
- writing purpose statements, progress reports and reports
- editing

REPORT WRITING ♦ SESSION 1

OBJECTIVES:

In order to write more effective reports, at the end of this session students will be able to do the following:

- identify the five basic steps to report writing
- identify the areas of their individual problems
- define the scope and purpose
- analyze the audience

TOPICS:

- writing a short report
- the five steps to report writing:
  - ⇒ define the problem
  - ⇒ gather the necessary data
  - ⇒ interpret the data
  - ⇒ organize the information
  - ⇒ write the report
- scope and purpose
- knowing your audience

METHODS:

- guided discussion of principles
- practice situations for discussion and writing

EVALUATION:

- pre-class exercise
- self evaluation on whether they defined objectives, explained criteria, pick and evaluated alternatives and recommended best course of action

MATERIALS:

- pre-class exercise
- assorted handouts

TIPS FOR THE WRITER

1. outline and structure

2. brainstorming: what are the alternatives
   - givens
   - assumptions
   - potential conclusions?

   ⇒ Can we start from a general conclusion, premise?
   ⇒ Will brainstorming lead into quicker actions? What are the implications? (e.g. identifying potential dangers, hazards, early on in project)
   ⇒ Exercises on brainstorming,
   ⇒ Using hypothetical situations

3. time issues: how much of engineer's time should be spent writing?
   if you don't have the ideas you need, go and **ask someone** for some quick insights before you spend too much time on this project.

4. use of supporting materials: How to use efficiently, and not as an artificial crutch to inflate report by size.
   Extracting pertinent data and putting it into text of report

5. technical aspects of constructing report

6. writing issues: liability issues
   no absolutes
   use qualifiers

7. verbal communication of the product (report)

PRE-CLASS EXERCISE

Write a short report on where you would recommend the next **landfill in Mercer County** be located.

WRITING A FEASIBILITY STUDY

Write a short report about where you would recommend the next **landfill in Mercer County** be located.

- define the objectives of the project
- explain your criteria clearly
- pick a limited number of alternatives
- evaluate each alternative
- recommend the best course of action

WRITING REPORTS FOR TECHNICAL STAFF

A good report is a set of intelligently analyzed facts.

There are 5 basic steps:

1. **Define the problem**
2. **Gather the necessary information and data**
3. **Interpret the data**
4. **Organize the information**
5. **Write the report**

Reports should be written for the readers who will use them. However many reports reflect the writer's process, not the reader's needs.

How you define the problem shapes the solutions you find. Accurate definition is essential for effective solutions.

Define your <u>Scope</u> and <u>Purpose</u> before you start your research. At the outset you must have an idea of the questions your report will answer. If your research alters your understanding of the problem, you can revise this section before putting it into the final report.

KNOWING YOUR AUDIENCE

It is important to identify just who will be reading your report, and what their expertise, interests and responsibilities are to it.

Technical writing is a process of translation:

Source
the technical information you know

Analysis
decisions about what information is/is not relevant to your audience

Translation
decisions on how to adapt your information for your audience

Audience

REPORT WRITING FOR TECHNICAL STAFF ♦ SESSION 2

OBJECTIVES:

In order to organize their thoughts to prepare to write effective reports, at the end of this session students will be able to do the following:

- brainstorm
- define goals
- identify alternatives, assumptions, implications and conclusions
- write a clear preliminary purpose statement

TOPICS:

- brainstorming
- defining the problem

METHODS:

- group work
- practice situations for discussion and writing

EVALUATION:

- group discussion of results of brainstorming situations

MATERIALS:

- assorted handouts and worksheets

BRAINSTORMING

- The clearer your ideas and goals are before you start, the easier your task will be.

- Recognize the complexities in the problem and define your goals realistically, focusing on your audience and purpose.

- The more possibilities you brainstorm, the more likely you are to find good options.

- Before you start your research think about the main issues you are trying to resolve:

  √ what are the alternatives?
  √ what are the assumptions?
  √ what are the potential conclusions?
  √ what are the implications?

- To get yourself started, try to think of a general conclusion or premise and work backwards.

- Have you seen the end result of a similar project before? What is the most similar real world example of a potential solution that you already know?

BRAINSTORMING SITUATIONS

Brainstorming might lead to early identification of potential hazards early on in the project, thus allowing the client to take action earlier than he would if had to wait until the report is completed.

Situation 1

Recommendation for site of new landfill in Mercer County

Situation 2

Emergency removal of buried drums near a school

Situation 3

Development of a program to land apply sludge (non-hazardous)

DEFINING THE PROBLEM

In order to write a clear preliminary **Purpose** statement, answer the following questions about a project you are working on:

1. Who is the audience or group(s) of affected parties facing the problem? Is it the client or others?

2. What is the problem or difficulty?

3. Why is it important to the organization that this problem be solved? (e.g. enforcement of laws, economics, future liability, citizen pressure, political issues)

DEFINING THE PROBLEM (continued)

4. What solution or action might you recommend to solve the problem?

5. What do you know about the organization, or the person/people in that organization that you will be dealing with?

REPORT WRITING FOR TECHNICAL STAFF ♦ SESSION 3

OBJECTIVES:

In order to write more effective reports, at the end of this session students will be able to do the following:

- identify problems with time management
- remain focused on writing issues throughout the project
- write progress reports
- report negative results effectively

TOPICS:

- time issues
- remaining focused on writing issues
- progress reports
- reporting negative results

METHODS:

- group work
- practice situations for discussion and writing

EVALUATION:

- self evaluation following group discussions
- teacher evaluation of progress reports

MATERIALS:

- assorted handouts and worksheets

TIME ISSUES

Tips for managing your time:

List all the sections your report will have.
Mark those that are most important to your reader.
Mark those that are most important to support your conclusions.
Spend most of your time on these sections.

Write the important sections first.

Allow yourself flexibility in your schedule to give yourself time to write.

How much of an engineer's time should be spent writing?

If you don't have the ideas you need, go and **ask someone for some insights** before you spend too much time on this project.

PROGRESS REPORTS

Progress reports do more than just report your progress. They keep you **focused** on your **objectives**. They can **identify potential dangers** for the client early on in the project, and they **create an image** of you as a capable, confident worker. They also make your **final report** considerably easier to write.

Progress reports may or may not be required by the client. Even if not required by the client, there is **internal reporting** to supervisors and senior management.

Remember your final report should hold **no** surprises for your reader.

To focus on what you have done and what work remains, organize your progress report in this way:

1. Summarize your progress in terms of your goals and original schedule. Is the focus correct? Does the original budget need to be revised?

2. Describe what you have done under the heading **"Work Completed."**

3. Describe what remains to be done under the heading **"Work to be Completed."**

4. Anticipate whether you will have the project and report completed on time. Be as positive and confident as possible even if there is a potential problem about not meeting deadlines.

REPORTING NEGATIVE RESULTS

When your research identifies negative or disappointing results what should you do?

Identify changes that might yield different results.

Identify circumstances that may have influenced the results.

Report what parts of the testing were positive.

Summarize your negative findings in progress reports to let your client down gradually and give him/her time to modify his/her plans.

Remember that negative results might in fact be a relief. As an impartial outsider, you can confirm suspicions that a project isn't feasible.

REPORT WRITING FOR TECHNICAL STAFF ♦ SESSION 4

OBJECTIVES:

In order to write more effective reports, at the end of this session students will be able to do the following:

- identify different sections of report outline using the suggested outline
- write a clear executive summary
- write a clear introduction, defining scope and purpose
- analyze data
- identify when to use the "Findings" section
- write clear conclusions and recommendations

TOPICS:

- the report outline
- executive summaries
- the introduction, including scope and purpose
- analyzing data
- findings, conclusions and recommendations

METHODS:

- guided discussion of principles
- practice situations for discussion and writing

EVALUATION:

- self evaluation following group discussions

MATERIALS:

- assorted handouts and worksheets

REPORT OUTLINE

EXECUTIVE SUMMARY: (1-3 pages)
audience (complex v simple)

1.0 INTRODUCTION

1.1 Scope and Purpose
⇒ geographic extent of work
⇒ define the problem

1.2 Background

1.3 Regulatory Constraints

2.0 DATA REVIEW
(subject oriented)

4.0+ CALCULATIONS etc.

5.0 IDENTIFICATION OF ALTERNATIVES

6.0 EVALUATION OF ALTERNATIVES

7.0 EVALUATION OF CRITERIA
(values to be considered)

8.0 FINDINGS
(especially in legal cases)

9.0 CONCLUSIONS

10.0 RECOMMENDATIONS

For Design Projects use:
- drawings
- specifications
- contract documents
- schedules
- permitting assistance

REPORT OUTLINE

EXECUTIVE SUMMARY

- tells the reader what the document is about
- summarizes the recommendation and the reasons for the recommendation
- because it is an overview of the main points, helps the reader to read more quickly
- uses a formal structure:
  - * the purpose of the research or the project
  - * the experimental method or data analysis methods
  - * the significant results
  - * the implications
  - * recommended action

INTRODUCTION

- contains a statement of **scope** and **purpose**

  The **scope** identifies how broad an area the report surveys. It allows the reader to evaluate the report on appropriate grounds.

  The **purpose** identifies the problem(s) the report addresses, the technical investigation it summarizes, and the rhetorical purpose (to explain, to recommend)

- contains a section on the **background** of the situation and the history of the problem
- identifies the **regulatory constraints** and other limitations

REPORT OUTLINE

BODY

- reviews the problem
- conducts the research
- analyzes the results
- identifies the alternatives
- evaluates the alternatives and eliminates those that are impractical or unworkable
- incorporates pertinent data to enhance the reader's understanding of the research's findings. (Use supporting materials efficiently, and not as an artificial crutch to inflate the report by size.)

FINDINGS

- sets out the findings according to legal parameters
- used, when appropriate, in legal cases where liability is an issue

CONCLUSIONS

- summarizes points made in the body of the report
- no new information should be included here

RECOMMENDATIONS

- states what you recommend to solve or ameliorate the problem
- make these easy to read
- use numbers, bullets, highlighting, etc.

ANALYZING DATA

When you analyze your data remember the following:

* **Observations** are statements that you yourself have verified.
* **Inferences** are statements that have not been verified.
* **Judgments** are not measurable and therefore cannot be proven.
* **Assumptions** are statements taken as facts, even though they have not necessarily been proven.
* **Premises** are statements of fact or assumptions upon which your argument is based.

Identify your **criteria for analysis**. Are there any regulatory constraints? What are the limits of the methods used?

When using data – numbers, charts, graphs – remember that they require **interpretation** and **context** to make sense.

REPORT WRITING FOR TECHNICAL STAFF
♦ SESSIONS 5 & 6

OBJECTIVES:

In order to write more effective reports, at the end of these sessions students will be able to do the following:

- apply the principles of good business writing
- use the appropriate style
- use strong verbs, preferably in the active voice
- use short, well-written sentences and paragraphs
- correct grammatical, mechanical and other problems of clarity and conciseness in their own writing and other exercises

TOPICS:

- effective presentation of information
- review of principles of good business writing
- editing
- correcting writing problems
- report writing checklist

METHODS:

- guided discussion of principles
- practice situations for discussion and writing

EVALUATION:

- post-class exercise
- identification and correction of writing problems

MATERIALS:

- assorted handouts and worksheets

EFFECTIVE PRESENTATION OF INFORMATION

- Use a more formal style than when writing letters and memos.

- Avoid using pronouns *I, we* and *you*. Rather, use company names.

- Use words that are accurate, appropriate and familiar.

- Use technical jargon sparingly.

- Explain acronyms and abbreviations the first time they appear.

- Use active verbs most of the time.

- Use strong verbs to convey meaning.

  c.f. This report *evaluates* the potential health impacts associated with using the site as a satellite campus.
  not This report *revolves around* the potential health impacts etc.

EFFECTIVE PRESENTATION OF INFORMATION

Eliminate unnecessary words.

c.f. Passaic County Community College's objective is to double its student population in the next five years.

not P.C.C. College's main objective is to increase its number of students. Specifically, the objective is to double its student population in the next five years by becoming a two-site campus.

Vary the length of your sentences.

Use parallel structure (particularly with heading and subheadings.)

4.3 Exposure Assessment.....
- 4.3.1 Identification and characterization of potentially exposed populations
- 4.3.2 Estimation of exposure point concentrations
- 4.3.3 Quantification of exposures

Begin most paragraphs with topic sentences (sentences that state the main idea of the paragraph that follows.)

WRITING: HELPFUL HINTS

Try to develop techniques that will help your audience to stay with you.

1. **Explain technical vocabulary.**

2. **Use short, well-written sentences.**
   The more complicated your information is, the shorter your sentences should be.

3. **Use short, well-constructed paragraphs.**
   The visual impact of the white spaces makes complex information easier to read.

4. **Use transition words to help your reader follow the development of your ideas.**

5. **Explain and analyze information given in charts, graphs and plans.**
   Don't leave your reader to interpret complicated figures and tables. If you take the time to explain these, your reader will be better able to follow your interpretations and conclusions.

6. **Use frequent closure.**
   Summarize preceding information. Pose questions and then answer them.

WRITING PROBLEMS

There are problems in the paragraphs below. These problems might be grammatical, mechanical or problems of clarity and conciseness. Identify what the problems are and correct them.

1. These calculated risks translate into an increase in background cancer risk for staff of less than four additional cancers in 10 million exposed staff and less than two additional cancers in 100 million exposed students in one lifetime.

2. Additional inspection of other items, including the galvanized steel roof, electrical conduit and plumbing, are required in order to determine if they can be salvaged.

3. Based upon the potential implementation of the remedial action described in Sect.3.1, above, the Board of Chosen Freeholders is considering facilitating the use of the Wanaque Site as an up-county satellite campus of Passaic County Community College.

4. Assessing the risks of exposure, a number of uncertainties in the impact evaluation are presented in this report.

5. Although a roof has already been placed on top of most of the building, it is not known whether the foundation was designed and constructed with the option of potentially adding a second floor in the future.

WRITING PROBLEMS

6. It should be noted that only a limited number of inside walls has been completed so far.

7. The masonry has a few minor superficial cracks and is very wet, however, it is structurally sound.

8. The waste was weighed before screening and, after screening, the material retained on and passing through the screen were each weighed.

9. It was estimated at the last meeting that the above scenario of utilization of the satellite campus would be appropriate.

10. Remediation consists of excavation, screening of the waste and the remaining waste being deposited in a properly designed on site waste enclosure.

11. Based upon the results of visual inspection, the Structural Review concluded that:

    * Much of the existing structure can be salvaged
    * Other elements require replacing
    * The roof system appears to be in good condition.

WRITING PROBLEMS

12. The remediation will be accomplished by dewatering the sludge, treating it with lime, and then use this material as cover or transport and then dispose the sludge.

13. The pre-Cretaceous basement bedrock complex that lies uncomformly beneath the unconsolidated Coastal Plain deposits consist mainly of approximately –100ft. (mean sea level) as demonstrated in figure 2.

14. Doing this process of landfilling sludge, objections from the DEP may be encountered.

15. In planning the remediation/landfill construction of the Sludge Lagoon, the area was divided into two cells; cell 1 & cell 2.

16. Grading costs using a bulldozer and a roller is based on a unit cost of $3,000/acre.

17. The report provided information and analysis relating to potential prospective disposal sites, it also discussed the feasibility of a variety of waste disposal technologies being implemented.

REPORT WRITING: CHECKLIST

PREPARATION

- ✓ Can I define my reasons for writing this report?
- ✓ What information do I need before I start writing?
- ✓ What questions need to be answered in this report?
- ✓ What do I know about the needs of my audience?
- ✓ Has a similar report been written previously, that might help me organize this one?

ORGANIZATION

- ✓ Does my first paragraph tell my audience the purpose of my report?
- ✓ Can my audience easily follow the progress of my ideas?
- ✓ Are my major points readily apparent to my reader?
- ✓ Have I used strong transitions?
- ✓ Is there any place in my report where my reader might get lost?
- ✓ Is there a proper conclusion to my report?

REPORT WRITING: CHECKLIST

STYLE

- ✓ Are my sentences concise and clear?
- ✓ Is my style appropriate to my audience?
- ✓ Have I defined all technical terms?
- ✓ Have I checked my spelling, grammar, and punctuation?